

The 'Dyoll' and the Bearing-dial

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THERE has recently been some discussion in the *Journal*¹ as to the meaning of the word 'dyoll' when it appears in English ship inventories of the years 1410-12, which have been partially published, by Nicolas² and Sir Alan Moore.³ Nicolas quotes from the Accounts and Inventories of John Starlyng, Clerk of the King's Ships to Henry IV, but he mistakenly dates these documents 1338, which date has been corrected by Moore to 1410-12.

According to the lists printed by Sir Alan Moore the *Christofre de la Toure* had 'iii compas, i dyoll'; miscellaneous gear in the King's Storehouse included 'ii betakles, ii seylyng nedeles, ii dyoll, iii compass'; and the *Marie de la Toure* had 'ii seylyng nedeles, i dyoll'.

Nicolas² quotes, from inventories of a little later date, entries such as 'one dyoll and one seylyng-needle' or 'iii compas and i dyoll' or 'i compass, i dioll' or 'i dioll, i compasse' and 'i boxe'. It has been noted as significant that the 'dyoll' stands in the lists next to either the 'compas' or to the 'seylyng nedeles' and therefore it has been thought to be part of the compass, i.e. the 'fly' or card.

On the other hand, inspection of the manuscript accounts of William Soper, the Clerk to Henry VI, shows amongst stores bought for or expended by the bigger ships, examples of 'compasses', 'bitakyll' and 'dyoll' or 'dioll', the words standing separate from each other in the dozen entries noted in the odd volume of Soper's accounts from 1422-27 now in the National Maritime Museum.

In the Naval Accounts and Inventories of Henry VII⁴ the language is English instead of the mixture of English, French and Latin of the earlier inventories. Amongst the stores of the *Marie of the Tower* (pages 50, 61 and 63) we find 'Compasses iii, Rennyng glasses i'; the *Martin Garsia* has (page 69) 'Compasses ii, Rennyng glasses ii'; the *Governor* has (page 72) 'Compasses iii, Rennyng glasses ii'; the *Mary Fortune* has (pages 327, 332 and 337) 'Compasses ii, Rennyng glasses i'.

The last-named ship has also 'Sayle nedylles, Grete and Smale cxii'. The great number of sail needles carried shows that these are for the sailmaker and we can accept Henry IV's 'seylyng nedeles' as compass needles. We are told (page 323) that two 'compaseys' and a 'Rennyng Glasse' together cost two shillings and twopence. It appears from the extracts quoted that compasses and running glasses always went together in Henry VII's naval inventories. For the next reign the inventory of the Great Bark of 1531 includes 'Item iii compassys and a Runyng glas'⁵.

An inventory of the *Ark Royal* is printed in *State Papers relating to the defeat of the Spanish Armada*.⁶ 'Compasses, iii, Roninge glasses iiiii' again stand together. The *Triumph* carried five of one and eight of the other; the *Elizabeth Jonas*, five and twelve; the *Bear*, six and eight. *The Court Records of the East India Company* for 1599-1603⁷ prints an inventory of the *Great Susan* (page 19) containing '7 Running glasses 7 Compasses'. There is also printed (page 218) a warrant, dated 3 May 1602, 'to pay unto Robert Grynkin for watches Compasses Runnyng Glasses and instruments for the shippes uses the somme of

xxx£ sterling'. This last seems to link the spring-driven watch with the sand-filled running glass, both being timekeepers and both appearing with the compass. If the 'dyoll' of Henry IV's inventories is really, as I think, a sand glass or watch glass (sometimes called the sea-clock), the name may have been changed, at the time the inventories were anglicized, by a new Clerk anxious to avoid confusion between sand glasses, clocks and the neat portable German sundials (incorporating a compass) which were becoming very popular ashore, although of little use to seamen. It is interesting to note that the watch glass as well as the compass were ship's stores, at least in Tudor times. Charts and navigational instruments on the other hand were generally private property of the officers concerned (as were the tools of the carpenter or the instruments of the surgeon) until well into the nineteenth century. It is surprising not to see the traverse board listed; probably this simple equivalent of the logboard for the illiterate was constructed on board by the ship's carpenter and not chargeable.

There is other evidence of the hour glass being regarded as only after the compass and chart in importance as a navigational instrument in the fourteenth and fifteenth centuries. Professor E. G. R. Taylor has told me of an Italian poem of 1304-13 which declares the magnetic needle, compass-chart and 'horologios' as the three essential instruments of the sailor.⁸ The French naval historian, de la Roncière⁹ quotes from a list of stores bought for a French warship in 1441: 'plusieurs compaes, aiguilles et oirloges de mer'. The 'horloge de mer', he explains, was the sand glass. Nicolas² mentions the purchase at Sluys in Flanders of twelve glass horloges, 'pro xii orlogiis vitreis', in 1345. The *Oxford English Dictionary* does not give glass as a meaning for dial, but then on shore the sand glass was, roughly, only used for timing sermons; the organization for turning it promptly was only to be found afloat, where there was a duty helmsman or lookout. Dial generally means the sundial, but in a fifteenth-century manuscript of Sailing Directions,¹⁰ written in English, we are told that in fifteen fathoms of water, off Penmarch in Brittany, the bottom is 'Smale diale sonde', which is glossed as being 'Fine sand, suitable for hour-glasses'.

A Spanish Chronicle, 'El Vitorial', of the deeds of a certain Don Pedro Niño, describes the use of the compass on board a Spanish galley in 1404¹¹: 'The pilots at once made ready. They looked to their compasses, activated by the lodestones, they opened their charts and began to prick and measure with the compass, for the course was long and the weather adverse. They observed the hour glass and entrusted it to a watchful man.'

Shakespeare reminds us, in Act V of *The Tempest*, that whereas landmen reckoned time by the hour, seamen did so by the glass (and Shakespeare may possibly have been mistakenly thinking of the sermon-type sand glass which did, I believe, run for one hour):

Alonso: How thou hast met us heare, whom three howres since were
wrackt upon this shore? . . .

Boatswain: . . . our Ship,
Which but three glasses since, we gave out split,
Is tyte, and yare, and bravly rig'd, as when
We first put out to See.

Smith, Manwaring and Boteler, the pioneer authors of English marine dictionaries of the first quarter of the seventeenth century, picture for us the steerage of a ship in their day, with its bittacle, compasses, watch glass and

traverse board. The glass told the helmsman when to peg the compass course on the traverse board; it told him when to call the watch; and it regulated spells of duty at the helm or on the lookout or at the pumps. With the aid of logship and half-minute glass the ship's speed through the water was calculated; and this speed, applied to the time supplied by longer running glasses, enabled the master or navigator to calculate the distance run. The sand glass, with dry, specially selected sand in a watertight glass container was the only suitable timekeeper on board ship and had been so throughout the centuries of sea voyaging. Henry IV's sea-dials were possibly half-watch (two-hour) and half-hour glasses, but we cannot be sure. Blanckley's *A Naval Exposition*, published in 1750 from a manuscript in existence dated 1732, lists and pictures to scale five different glasses, the watch glass of 4 hours, the half-watch, the half-hour, the half-minute and the quarter-minute (the last two log glasses). Although the logship had not been invented in the fifteenth century (first described 1573), it is not difficult to estimate slow sailing speeds with some degree of accuracy. Old pilot books, such as that described by B. R. Motzo^{8, 12}, give soundings (the leadline must be of extreme antiquity), compass bearings and distances and the navigator must calculate distance run by guessing the ship's speed through the water and calculating the passage of time by means of sand-glasses. Outside the Mediterranean the problem of tides (I speak with experience of an old-fashioned Pilot Cutter which appears almost medieval as she sails through Cowes Roads during the Week) is simplified if you let them cancel out in your dead reckoning every twelve hours. I think a good case can be made for the importance of the sand glass to seamen in the fourteenth and fifteenth centuries.

In 1594, John Davis stated the 'Sea Compasses, Chart and Crosse Staffe' to be instruments sufficient for the seaman's use, but he was addressing particularly the scientific seaman.

Blanckley also records the word 'diall' used on board a man-of-war in the eighteenth century, certainly not in the sense of a bearing-plate or bearing-dial: 'DIALL—A Square Piece of Wood, framed and made not unlike the Dial Plate of a Clock, whereon the Hous are painted, fixed to the Mizon-Mast, and after the Ship's Bell being struck, they put the Hand of it to the Hour.'

REFERENCES

- 1 A Norse bearing-dial? This *Journal* (Forum), 7, 78.
- 2 Nicolas, Sir H. H. (1847). *A History of the Royal Navy*, Vol. II, pp. 444, 475, 476.
- 3 Moore, Sir Alan (1914). Accounts and inventories of John Starlyng, *The Mariner's Mirror*, 4, pp. 20, 167.
- 4 *The Naval Accounts and Inventories of the reign of Henry VII, 1485-8 and 1495-7*. Edited by M. Oppenheim for the Navy Records Society, 1896.
- 5 Carr Laughton, L. G. (1919). The inventory of the Great Bark, 1531. *The Mariner's Mirror*, 5, 21.
- 6 *State Papers relating to the defeat of the Spanish Armada, Anno 1588*, Naval Records Society (1894), Vol. II, p. 241.
- 7 *The Court Records of the East India Company for 1599-1603*. Edited by H. Stevens (1886).
- 8 See Taylor, E. G. R. (1951). The oldest Mediterranean pilot. This *Journal*, 4, 81.
- 9 de la Roncière (1914). *Histoire de la Marine Française*, Vol. II, p. 511.
- 10 Vol. 79 of the first series of Hakluyt Society publications.
- 11 *El Vitorial*. Translation by Joan Evans in the Broadway Medieval Library.
- 12 Motzo, B. R. (1947). *Il compasso da Navigare*. Cagliari University.

Commander W. E. May comments :

Mr. Naish's identification of the dyoll with the watch-glass is most interesting and would seem to be a very probable solution. In extension, it may be of interest to record that from 1686 until 1728 the compass and glass always went together in contracts for their supply to the Royal Navy. 1686 is the date of the earliest of these contracts which has been traced and it is believed that before that time the instruments were bought as and when required and that there was no single contractor for the whole Navy. After 1728 the Navy employed its own compass-maker, but glasses were still purchased outside.

The contract prices paid for glasses were:

	1686	1715
Watch-glass	3s.	2s.
$\frac{1}{2}$ watch	1s. 6d.	1s.
$\frac{1}{2}$ hour	6d.	6d.
$\frac{1}{2}$ minute	6d.	6d.

The allowance of glasses by a store establishment of 1689 was one watch-glass and one half-watch-glass to each vessel, while the numbers of half-hour and half-minute glasses varied from fifteen and six respectively for a first-rate to four and three for a sixth-rate.

From about the middle of the seventeenth century the log-glass, though still nominally a half-minute glass, often ran for only 24 to 28 seconds. It had been the custom to make the log-line 42 feet between knots, and when it was found that this should have been 51 feet the diehards preferred to keep the length of their log-lines at 42 feet and to correct for the error by using a shorter-running glass. The variation in running time of 24 to 28 seconds reflected different opinions as to how much the log-ship might come home and the advantage or otherwise of being astern of one's reckoning.

The inventories of the ships *Primros Ann Abbotte*, *Crowne*, *Sciscillian* and *James ye Second*, which it was proposed to take up for the Navy in July 1690, all give the numbers of glasses immediately following those of compasses.